Ocular Wavefront Treatment
When? Why? How?

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Problems for OWF

- Pupil size
- Accommodation

Accuracy vs Pupil Size

When to use WF treatments

• Large pupil
• Consistent scan sequence

Note that even AF treatments are based on WR

**Recommendation***

START WITH OWF SCAN at every routine pre-LASIK consultation
In routine treatment

- Pupil size >5.5mm (for OZ = 6.5mm)
- \(3\) scan sphere range <0.5D
- \(3\) scan cyl range <0.5D
- \(3\) scan axis range <15° (if cyl >0.5D)

- Target refraction = actual + 0.5*(MRSE-WRSE)

Amaris OWF Myopic LASIK 2013
164 eyes
3 month results

\[ y = 1.0386x - 0.0013 \]
\[ R^2 = 0.9818 \]

Achieved Spherical Equivalent Refraction (D)
Attempted Spherical Equivalent Refraction (D)

Spherical Equivalent Attempted vs Achieved

Pre-op MRSE
Mean = -4.98D
SD 2.29D
Range = -1.00 to -10.25D

MRSE Error
Mean = 0.19D
SD = 0.33

Overcorrection
Undercorrection
Spherical Equivalent Attempted vs Achieved

Amaris AF Myopic LASIK 2013
99 eyes

\[ y = 1.0201x + 0.0379 \]
\[ R^2 = 0.9883 \]

MRSE Error
Mean = 0.14D
SD = 0.29

Pre-op MRSE
Mean = -5.11D
SD = 2.52D
Range = -0.75D to -10.63D
Why OWF?

• Perceived benefits (marketing)
• Visual quality
• Protection from human error
• Accuracy (MR±0.5D** vs WR±0.25D*)


Optom Vis Sci 2007 May;84(5):387-92 - WR>MR
Visual Quality

Myopic LASIK treatment type

- OWF vs AF: $p=0.03$ (t test)
- OWF vs iDesign: $p=0.39$ (t test)

Mean (SD) RMS HO Aberrations (µm)
Amaris OWF Myopic LASIK 2013
164 eyes
3 month Results

±0.50D = 92.1%
Amaris AF Myopic LASIK 2013
99 eyes
3 month results

±0.50D = 88.9%
±1.00D = 99.0%
HOW?

- Dark adapt
- OWF scans before other scans
- Standard instructions
- Head position – no tilt
- Quick acquisition
- 3 good scans per eye
- Registration image – SCC/centroid shift
- NO PUPIL OFFSETS
Irregular astigmatism – why OWF?

• Manifest
  -0.50/-2.75x80 (6/15)
• Wavefront
  +1.09/-5.09x68
• Post op
  +0.75/-0.5x180 (6/7.5)

Manifest refraction very inaccurate in irregular astigmatism

Ignore if OWF scans repeatable?

42 year old DALK for KC
OWF in Irregular Astigmatism

Especially ectasia
CXL + TransPRK

*Simultaneous vs Sequential*

- Better circumscribed epithelial removal = faster healing
- Correction of defocus = faster visual rehabilitation
- Avoids ablation of cross-linked tissue
- Ablation post CXL associated with undercorrection and increased haze
LO constraints = Deeper ablation

-ve Sph Ab

Tissue removed
OWF treatment

When? | Why?
---|---
• Routine LASIK – Visual quality + ?accuracy
• TransPRK+CXL – low ablation depths

How?

• Simultaneous registration image

Thank you  www.allan.vu